REMARKS/ARGUMENTS

Summary of Office action

The following objections and rejections were made in the Office action dated March 29, 2004:

- claims 1 - 18 were rejected under 35 U.S.C. § 112 on the basis that the claimed invention is not supported by the specification;
- claims 1 - 11 and 17 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious in light of the reference RAYMOND Y. CHIAO, "Tunneling Times and Superluminality: a Tutorial", arXiv:quant-ph/9811019v1, 7 Nov. 1998, pgs 1 - 13 (the Chiao reference); and
- the drawings were objected to under 37 C.F.R. § 1.83 for failing to show every feature of the claimed invention;
- the specification was objected to under 35 U.S.C. § 112 for the improper use of the term "superluminal" to imply that there exists a speed faster than the speed of light, beyond the group velocity effect.

Rejection under 35 U.S.C. § 112

Two rejections were made under 35 U.S.C. § 112. The first relates to the use of the term superluminal. The attached replacement specification has been amended to use the term superluminal in quotation marks. The use of quotation marks has been adopted at the suggestion of the Examiner to indicate that it is not being used to indicate that there exists a speed

faster than the speed of light, beyond the group velocity effect.

The second rejection under 35 U.S.C. § 112 is asserted to be appropriate because there is no clear basis for the statement "*When the tunneling direction is in the direction of the red shift in the cosmic microwave background, the tunneling time is shortest and when the tunneling is in the blue shift direction the tunneling time is longest.*" The following are Applicant's responses to the two questions posed in conjunction with this rejection:

1. How can any shift be perceived while standing next to the measuring apparatus as there is no differential shift in velocity being measured?

Applicant does agree that the reference frame of a device in accordance with the present invention will be moving in the direction of the red shift of the cosmic microwave background radiation. However, Applicant respectfully disagrees with the statement that there is no differential shift in velocity being measured. Even while standing next to the measuring apparatus, the measuring apparatus is moving. When located in the United States, planetary rotation causes the tunneling direction of the measuring apparatus to continuously change position relative to the red shift of the cosmic microwave background radiation. Similarly if the device were to be rotated, then the rotation would necessarily vary the tunneling direction with respect to

the direction of the red shift of the cosmic microwave background radiation.

2. What is the "direction of the red shift"?

Applicants have submitted an Information Disclosure Statement accompanying this response. The Information Disclosure Statement encloses the following reference K. Hagiwara et al. Physical Review D66, 010001-1 (2002) (Accessible at URL http://pdg.lbl.gov - The Hagiwara reference). This reference describes the theory that the Earth occupies an absolute reference frame relative to the Universe. The Hagiwara reference describes how the Earth's absolute reference is believed to have been measured using the Doppler shift in the cosmic microwave background radiation. The so called "direction of the red shift" is described as being the most accurate measurement of Earth's absolute motion relative to the universe. Applicants submit that the Hagiwara reference describes the understanding of the term "direction of the red shift" possessed by one of ordinary skill the art.

The claimed invention does not measure the "red shift" *per se*. Rather, the results of the claimed invention have been theoretically verified by comparison to the "direction of the red shift" as determined by others. According to the understanding of the "red shift" possessed by one of ordinary skill in the art, this verification supports the conclusion that the claimed invention is capable of determining the direction of the Earth's absolute motion relative to the universe.

Applicant make the additional observation that claims 1 - 11 do not refer to measuring the direction of the absolute reference frame of the Earth with respect to the universe or to measuring the direction of the "red shift". These claims simply relate to the measurement of tunneling time of wavepackets. Therefore, the rejection of claim 1 - 11 under 35 U.S.C. § 112 is entirely inappropriate.

Rejection of claims 1 - 11 and 17 under 35 U.S.C. § 102(b)

In the Office action, the assertion is made that the measurement performed by the claimed measurement apparatus would be present in the output of a device described in the Chiao reference. Applicants respectfully disagree on the basis that the Chiao reference is insufficiently precise to measure variations in the group velocity associated with changes of orientation of the instrument (be they due to rotation of the earth or due to physically moving the instrument with respect to the earth).

The Chiao reference describes measurement of group delays of the order of $1.47 \pm 0.2 \times 10^{-15}$ s. The error margin of this measurement (i.e. $\pm 0.2 \times 10^{-15}$ s) is too large to measure the variations in the group velocity that occur as the orientation of the device changes. The instrument resolution ($\Delta\Delta\tau$ - see Tutorial submitted with response dated August 22, 2004) required to measure variations in the group velocity associated in changes in device orientation is given by the following standard equation:

$$\Delta\Delta\tau = \frac{4\pi}{\omega_{\min}} - \frac{4\pi}{\omega_{\max}}$$

Applicants determined that the photons measured by the Chiao system have a minimum wavelength of 697 nm and a maximum wavelength of 703 nm. These wavelengths correspond to a maximum frequency of 4.30 x 10^{14} Hz and a minimum frequency of 4.27 x 10^{14} Hz. The relationship between frequency and angular frequency is:

$$\omega = 2\pi f$$

Therefore, the required resolution of the Chiao system ($\Delta\Delta\tau$) is:

$$\Delta\Delta\tau = 0.04 \times 10^{-15} s$$

As mentioned above the error margin of the Chiao reference is ± 0.2 x 10^{-15} s. Therefore, the Chiao reference has an error margin that is an order of magnitude too large to enable the observation of changes in group velocity that result from changes in the orientation of the device relative to the absolute reference frame of the earth. Therefore, the Chiao reference does not anticipate any of the claims (as amended).

Objection to drawings

Applicant submits that amendment to the drawings is not required on the basis that the orientation of a device placed in one position within the United States is in fact being

continuously altered due to planetary rotation. If the Examiner does not agree, Applicant proposes amending FIG. 1 to include an arrow indicating the rotation of the illustrated embodiment.

Conclusion

Applicant respectfully requests the issuance of a Notice of Allowance on the basis that the above amendments place the application in condition for allowance. The amendments to the specification eliminate the improper implied use of the term "superluminal" and the above remarks explain that motion of the claimed invention relative to the absolute reference frame of the Earth with respect to the universe enables the claimed invention to locate the direction of this absolute reference frame. In addition, the above remarks explain that the measurements made by the claimed device have been theoretically verified by comparison with the measurement of the "direction of the red shift", which has been measured by others and is thought to indicate the direction of the absolute reference frame of the Earth. Applicant also observes the rejection under 35 U.S.C. § 112 of claims 1 - 11 is unwarranted as the claims are directed to a device for measuring tunneling times. As pointed out in the above remarks, the ability of the claimed invention to measure group velocities with sufficient accuracy to observe changes in the group velocity associated with changes in orientation of the measurement device distinguishes the claimed invention over the prior art of record.

In the event that contact with Applicant's counsel would be of assistance to the examiner, please do not hesitate to call them at the number listed below.

Respectfully submitted,

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By _____

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Limited Recognition under 37 CFR § 10.9(b)
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